Kosicki, International Electron Device Meeting and IEDM Technical Digest, pp. 567-570, December 2001 (hereinafter the "Reich 01" reference).

Herewith is submitted from each co-inventor named in the instant application a Declaration under 37 C.F.R. §1.132 stating that the co-inventors conceived or invented the subject matter of this application that is disclosed in the Reich '01 article. With the submission of these declarations, the Reich '01 article is removed as a reference under 35 U.S.C. §102(a).

The MPEP states at MPEP2132.01 that Applicants' disclosure of their own work within one year of the application filing date cannot be used against the Applicants under 35 U.S.C. §102(a). *In re Katz*, 687 F.2d 450, 215 USPQ 14 (CCPA 1982). The Reich '01 publication therefore is removed as a reference by the Declaration from each co-inventor establishing that the article describes the Applicants' own work. *In re Katz*, 687 F.2d 450, 215 USPQ 14 (CCPA 1982).

In the Applicants' Declarations, it is stated that the co-authors of the Reich '01 article that are not named as co-inventors on the instant application did not contribute to conception or invention of the invention claimed in the instant application, and instead, carried out activities related to the fabrication and testing of the invention under the supervision of the inventors, or defined a need for the invention. As stated in the Declarations, D.M. O'Mara conducted testing and characterization of CCD devices. J. Young was a fabrication process engineer responsible for CCD fabrication processes. A.H. Loomis was a fabrication process engineer also responsible for CCD fabrication processes. D.M. Craig wrote software for conducting testing and characterization of CCD devices. S.A. Watson defined desired CCD performance characteristics for addressing specific applications and requested design solutions. M.D. Ulibarri also defined desired CCD performance characteristics for addressing specific applications and

requested design solutions. None of these activities constituted conception or invention of the invention claimed in the instant application. As a result, the Reich '01 publication is removed as a reference by the Declaration from each co-inventor because Applicants' disclosure of their own work within one year of the application filing date cannot be used against the Applicants under 35 U.S.C. §102(a).

At Page 3 of the Examiner's Action, the Examiner referred to a second Reich article, "Integrated Electronic Shutter For Back-illuminated Charge-Coupled Devices," IEEE Transactions on Electron Devices, Vol. 40, No. 7, pp. 1231-1237, July 1993 (hereinafter referred to as the "Reich '93" reference). But the Examiner did not cite a statutory basis for applying the Reich '93 reference to reject the claims; only the Reich '01 reference is cited in a statutory rejection of the claims. No rejection of the claims based on the Reich '93 reference is found and it is not clear if the Examiner intended to reject the claims over the Reich '93 reference.

If the Examiner intended to apply the Reich '93 reference against the claims, such is not warranted. The Reich '93 reference fails to teach or even suggest fundamental aspects of the invention required by the claims.

Independent claim 1 requires an array of super pixels disposed in a semiconductor substrate, with each super pixel including a plurality of independently-controlled subpixels and each subpixel corresponding to a frame in a sequence of image frames. The Reich '93 reference does not teach or even hint at a configuration of a super pixel or a correspondence between subpixels and a sequence of image frames as required by claim 1.

Claim 1 further requires that the charge collection channel region, the charge drain regions, and the charge collection control layer of each subpixel be characterized by a dopant type and dopant concentration for expanding the charge collection channel region in response to a charge collection control voltage applied to the channel region control electrode, to collect in the charge collection channel region photogenerated charge from the substrate during the image frame corresponding to that subpixel.

Claim 1 additionally requires dopant types and concentrations for the subpixel regions recited just above for contracting the collection channel region in response to a charge storage control voltage applied to the channel region control electrode, to store the collected photogenerated charge in the charge collection channel region and collect substantially no additional photogenerated charge as other subpixels of the super pixel collect photogenerated charge corresponding to other frames of the image frame sequence.

Reich '93 does not remotely teach or even hint at subpixel region dopant types and concentrations that would enable a subpixel to store collected photogenerated charge as other subpixels of a super pixel collect photogenerated charge corresponding to other frames of an image frame sequence.

As explained in the instant Specification at paragraphs 45-46 and shown in Fig. 3C, with this configuration, the imaging array bias, V_{IA}, can be set to produce a contracted collection region 66, and the applied shutter drain voltage, V_{SD}, can be set to maintain the p-n junction of each shutter drain and the substrate in a reverse biased condition but limited such that the depletion region associated with the reverse biased junction does not extend beyond the p-type buried layer. Under these conditions, photoelectrons in the substrate are

repelled from the subpixel collection region and are directed toward other subpixels having an expanded collection region like that shown in Fig. 3B.

This subpixel configuration and control state result in fixed storage of previously-collected charge at a subpixel as illumination continues, with photogenerated charge from the continued illumination being directed away from the subpixel such that no charge is added and the charge store remains substantially fixed. This enables each super pixel to accurately acquire the true image for each frame in an image frame sequence while at the same time storing previously acquired frames of the sequence, for transfer of the frame sequence from the super pixel only after the entire sequence of frames has been collected.

It is the subpixel dopant type and concentration recited in claim 1 that enable this direction of photogenerated charge away from a subpixel storing charge and toward other subpixels collecting charge, so that the super pixel accurately acquires a true image for a given frame while storing charge from other frames for transfer only after the entire sequenced of frames has been collected. The Reich '93 reference does not teach or suggest a subpixel dopant type and configuration for this super pixel operation, let alone any super pixel configuration or operation as required by claim 1.

Independent claim 10 requires the super pixel configuration recited in claim 1 and further requires that each subpixel in the super pixel include a channel region control voltage connection that is configured for independent collection and storage of photogenerated charge from the substrate at the charge collection channel region of a subpixel during a corresponding frame in the sequence of image frames.

In the invention, each subpixel channel region has a control voltage connection, as shown in Figs. 3A-D, that enables independent collection and storage of photogenerated charge during a corresponding frame in an image frame sequence. As explained above, with this independent control, a given frame image is accurately captured only by a selected subpixel(s) of a super pixel. Each subpixel is independently controlled to enable such.

The Reich '93 reference does not teach or even hint at a subpixel control voltage connection for independent control of a plurality of subpixels for storage of photogenerated charge during a sequence of image frames. The Reich '93 reference does not provide even a suggestion of configuring subpixels and controlling the subpixels independently to acquire a sequence of image frames as required by independent claim 10.

Independent claim 21 requires the super pixel configuration recited in claim 1, and further requires that the number of subpixels included in each super pixel be selected based on the length of an image frame sequence and the frame rate of the sequence, to collect photogenerated charge from each frame in the image frame sequence by at least one corresponding subpixel of the super pixel and store the collected charge at the corresponding subpixel as other subpixels collect photogenerated charge from other frames in the image frame sequence.

As explained above, the Reich '93 reference does not provide even a suggestion of configuring subpixels to acquire a sequence of image frames. The Reich '93 reference accordingly is devoid of teaching or suggestion as to selection of a number of subpixels based on the length of an image frame sequence and the frame rate of the sequence as required by independent claim 21.

All remaining claims depend from one of independent claims 1, 10, or 21 and include the limitations of such. It is therefore submitted that the Reich '93 reference neither teaches nor suggests the invention of claims 1-24. The Reich '91 article has been removed as a reference by the Applicants' Declarations. The Applicants therefore respectfully submit that the claims are in condition for allowance, which action is requested.

If the Examiner has any questions or would like to discuss the instant application, he is encouraged to telephone the undersigned Agent at his convenience at the phone number given below.

Respectfully submitted,

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